

DOCUMENT-IDENTIFIER: US 5023750 A
TITLE: Electronic component having improved low resistance
contact and
manufacturing method therefor

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BSPR:

Subsequently, description will be given of the fact that a capacitor of a multi-layer film structure having the silicon nitride film 5 and the silicon oxide film 13 has a smaller capacity than a capacitor which only has a silicon nitride film. It is assumed here that the ratio in dielectric constant between the silicon nitride film and the silicon oxide film is 2:1.

In this instance, if the thickness of the silicon nitride film is 60 .ANG., then the film thickness corresponds to 30 .ANG. where it is converted into a thickness of a silicon oxide film which has an equivalent capacity. However, in the case of the multi-layer film structure, if the thickness of the silicon nitride film is 60 .ANG. and the thickness of the silicon oxide film 10 .ANG., the thickness of a silicon oxide film having an equivalent capacity is 40 .ANG.. ~~The~~

~~electric charge accumulating capacity of a capacitor increases as the thickness of a dielectric layer decreases.~~ Accordingly, the multi-layer film structure having a silicon nitride film and a silicon oxide film has a small electric charge accumulating capacity comparing with a capacitor of a single-layer film structure only having a silicon nitride film. Meanwhile, a natural oxide film or a contamination oxide film is not formed intentionally. Accordingly, the conventional process of production has a problem that a capacitor actually produced has a smaller capacity than an intended electric

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charge accumulating
capacity.

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The dielectric film of the capacitor which is formed using any of such producing processes as described above is composed only of a silicon nitride film 5. This can be seen from the atomic analytical view of FIG. 6 which shows of an atomic analysis of the dielectric film by the Auger electron analysis.

In particular, referring to FIG. 6, the distribution of atoms of oxygen (O) is reduced in the neighborhood of the boundary between a region of the silicon substrate 1. This indicates that no silicon oxide film exists on the interface

between the two regions. By preventing the presence of a silicon oxide film between the silicon substrate 1 and the dielectric film (silicon nitride film)

5 in this manner, the capacity of the capacitor has a high dielectric constant

of the dielectric film and has a good leak current characteristic. Further,

reduction in thickness of a dielectric film can be promoted This is because

conventionally the influence of an undesirable oxide film has relatively

increased in proportion to reduction in thickness of a dielectric film to

hinder an increase of the capacity of a capacitor.

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